# DOLTRON-PIM 717
## SERVICE MANUAL

## SPECIFICATIONS : DOLTRON PIM 717

| | | |
|---|---|---|
| Flow Range | : | 1ml/h - 69ml/min |
| Volume Display | : | 0,1 - 999,0ml |
| Accuracy, Pump | : | ± 2% |
| Accuracy, IV Set | : | ± 5% by a random selection of standard IV sets |
| Alarm Systems | : | audible, visual, nurse-call |
| Alarm Conditions | : | end, air (all fluids), battery operating failure, occlusion |
| Power Requirements | : | 220V/50Hz, 110V/60Hz |
| Protection | : | Class 1 |
| Mark of Approval | : | SEV, IEC 601 Part 1, VDE 0750 T.1/05.82 ⚠ ♥ ◊ ⑤ |
| Battery | : | 2x12V, 1,8Ah sealed lead acid |
| Battery Operation | : | Typical operating time for fully charge new batteries; 30ml/h ca. 3 hours 60ml/min ca. 1 hour |
| Case Dimensions | : | 170x255x220mm (WxHxD) |
| Weight | : | 5,2kg without batteries 6,9kg with batteries |

15.12.1981
08.08.1985

## OPERATING INSTRUCTION

Connect pump to a grounded socket outlet, unless battery operation is desired. Red dot on the panel display indicates connection to mains.

### Preparing the I. V.

Consult I. V. set instruction. *Clear air completely*. Place infusion set in the pump and close lid firmly. Set prescribed ml dose-limit-total on Thumb-wheel Selector. Select desired infusion rate ml/h or ml/min on delivery rate Thumbwheel Selector. (Blinker signals ml/min operation). Make venipuncture.

### Infusion

Push Green ON/OFF Button to turn on power. Push Yellow START Button to start pumping. Infused volume is on running display. Pump stops when total dose volume has been pumped.

### Changing or Discontinuing I. V.

For intermediate stops, push Red STOP Button. Infused volume reading holds on display. If desired adjust Volume and/or Rate Selectors to new values. Changing of the Rate during running infusion automatically stops the pump.

CAUTION: Do not open pump lid unless clamp has been closed.

### Battery Operation

The Green ON/OFF Button remains dark during battery operation.

### Battery Recharge

With the pump connected to the mains supply power, the batteries will recharge regardless of operation.

### Maintenance

Use cotton sticks dampened with alcohol to keep the two tubeholding sensors underneath the pump lid clean at all times. Unclean sensors will activate the Alarm ‹8› and stop the pump. Disconnect pump from mains power befor cleaning housing. Use cloth dampened in soapy water.

## ALARM INDICATIONS

By Alarm Indication the pump stops immediately. The Red STOP Button lights up and an audible alarm signals the attendant. The alarm signal may be suppressed temporarily for approx. one minute by pushing button on the back of the pump. With the remote Nurse Call Alarm connected (socket on the back of the pump), no other audible alarm will sound.

### Dose Limit

The pump stops when preselected total volume and infused volume on display tally.

### Air-In-Line ‹8›

An ‹8› will flash alternately with the infused volume on display. The two tube holders on each side of the peristaltic under the pump lid are both equipped with infra-red sensors for air detection in all liquids regardless of optical density.

### Operational Error

Opening of the pump lid during infusion will trip the alarm.

### Pump Malfunction

By malfunction, the pump stops and cannot be restarted.

### Battery Alarm ‹b›

Estimated Battery Operation Capacity is approximately 3 hours at 30 ml/h or one hour at 60 ml/min.

With increasing battery discharge the alarm is tripped. A ‹b› will flash alternately with infused volume on display. Pump will continue pumping, but must be connected to mains supply power with a minimum of delay.

CHECKLIST : DOLTRON PIM 717

Alarm and Control Functions

1. <u>Pump Lid Alarm</u>: Start pump and open lid. Pump must stop
and activate audible alarm.

2. <u>Air-in-line</u> : <u>Air-Sensor control test</u>. Start pump. Interrupt
infrared light beam in the left tube holding
Air-Sensor under the pump lid. Repeat for the
right sensor. Pump must stop and activate
audible and visual ‹8› alarms.

<u>Air-Sensor control test with empty tubing</u>.
Insert fresh, transparent piece of empty
PVC-tubing (3x4mm) into the pump and start.
Pump must stop and activate audible and visual ‹8›
alarms.

<u>Air-Sensor control test with filled tubing</u>.
The Air-Sensors will detect air bubbles entering
the pump regardless of liquid optical density.
Air bubbles should trip the audible and visual ‹8›
alarms throughout the normal infusion rate flow
range viz. up to approx. 15ml/min. However, the
Air-Sensors are subject to an electronically
controlled time delay in order to pass air
bubbles of approx. 5-8mm in the upper transfusion
rates. Check at 69ml/min.

3. <u>Dose Limit</u> : Select a three digit dose limit between 100-999ml.
Start pump. Pump must stop and activate the
audible alarm when dose limit and display tally.

4. <u>Low Battery</u> : When the batteries run low, the audible and
visual alarms are activated and signal recharing
‹b›. The pump will continue normal operation
until battery power is exhausted. Check battery
power with DVM connected to L1 and L3 on board
no. 25200. Battery alarm must be activated when
voltage is lower than 22.0V to 22,8V. Trim with R7.
Pump must cease to operate, when voltage is lower
than 19,0V to 20,5V. A complete recharge of low
batteries requires 14 hours.

5. <u>Remote Alarm</u> : The pump can be connected to the hospital nurse-
call system for remote monitoring of all alarm
conditions. Use a Lemo plug no. F0S304NB042 for
connection to pump. Consult wiring circuitry on
the back of the pump or on print no. 25200.
(Doltron part no.: 25012).

6. <u>Change in Rate</u>: Radical changes in the delivery rate should stop
the pump. No alarm.

7. <u>Motor Control</u> : The motor is electronically controlled in order
to prevent a run away, over flow in case of a defect
Check by disconnecting Motor Control tacho meter.
Start pump. Pump should stop after max. 7 motor
revolutions, not to be started again.

8. Occlusion         : The occlusion alarm function is expressly
                       designed to detect undue pressure build-up
                       in the infusion range of the PIM 717 viz.
                       1ml/h - 30ml/min. With increasing rate
                       sensitivity is reduced electronically in
                       order to avoid false alarms in the transfusion
                       range.

                       Check by clamping tube approx. 30 cm downstream
                       from pump. Depending on the length of the tube
                       enough pressure should build up to trip the
                       alarm inside 2 - 5 ml. Pump must stop and
                       activate audible and visual ‹O›  alarms.

## SPECIAL CHARACTERISTICS

ON/OFF Button            : If turned off, the pump can only be
                           restarted after a delay of approx.
                           2 - 3 seconds.

                           During battery operation, the ON/OFF
                           Button remains dark.

START Button             : After the pump has been turned on, the
                           electronic systems need time (max. 3
                           seconds) in order to coordinate prior
                           to operation. If the START Button is
                           pressed prematurely, the pump returns
                           to STOP.

Time Counter Holder      : On board no.: 25200 the PIM 717 has a
                           holder (similar to a fuse holder)
                           intended for a cumulative electrolysis
                           operating time counter. Not supplied.
                           (Doltron part no.: 25061 ).

15.12.1981

SERVICE PROCEDURE :   DOLTRON PIM 717


Prior to any service adjustments, run pump for about
10 minutes in order to warm it up.


A) <u>Air-Sensors</u> :   print no.: 25210


    1. Closed pump lid. No tubing inserted. Beware of
       influence from surrounding light.

    2. Short M9 to Ground.

    3. Connect M7 (-) and M8 (+) to DVM.

    4. Balance with P4 to 0V.

    5. Interrupt light beam, right sensor.
       Voltage should drop to -13,2V to -14,0V.

    6. Interrupt light beam, left sensor.
       Voltage should rise to +13,2V to 14,0V.

    7. Insert fresh, transparent piece of empty PVC-tubing.
       Balance voltage with P4 to + 1.6 - 2.0V

    8. Remove tubing. Voltage should drop to 0,1V to  0.5V

CAUTION: The light-sensors must be replaced in pairs.
         Do not replace single sensors. Use original
         by Doltron calibrated sensor pairs only. Part no. 25060
         Consult color code on p. 15.

B) <u>DA/AD converter</u> :   print no.: 25210     <u>METRIC VERSION</u>

    1. Press STOP Button.

    2. Set rate on thumbwheel to 00ml/(min or h).

    3. Open bridge B2. Connect DVM at M5.

    4. Set to 0,000V ± 0,001V with P1.

    5. Shorten B2 and set to 0,000V ± 0,003V with P2.

    6. Set rate on thumbwheel to 69ml and check voltage at M5.
       Voltage should rise to 3,38V. For tolerances, see p. 5.

    7. Connect Period-Counter at M6. Set period with P3 to
       169,8 micro seconds.

    8. Set rate on thumbwheel to 01ml and period duration
       with P2 to 11.500 micro seconds.

    9. Repeat items 7 and 8!

Re 82.1

INCH VERSION:

1) To be used in pumps                    25005    110V    INCH
   with the Type Nos.:                    25006    220V    INCH
                                          25007    240V    INCH


2) On board no. 25210 the PIM 717 inch-version has an
   "Inch-Adapter" no. 25232, instead of metric version
   Ic 26. The value of R57=10K



C) <u>DA/AD converter</u> : print no.: 25210

   1. Press STOP Button.
   2. Set rate on thumbwheel to 00ml/min or h.
   3. Open bridge B2. Connect DVM at M5.
   4. Set to 0,000V ± 0,001V with P1.
   5. Shorten B2 and set to 0,000V ± 0,003V with P2.
   6. Set rate on thumbwheel to 69ml and check voltage at M5.
      Voltage should rise to 3.38V. For tolerances, see p.5.
   7. Connect Period-Counter at M6. Set period with P3 to
      <u>113.2</u> micro seconds.
   8. Set rate on thumbwheel to 01ml and period duration
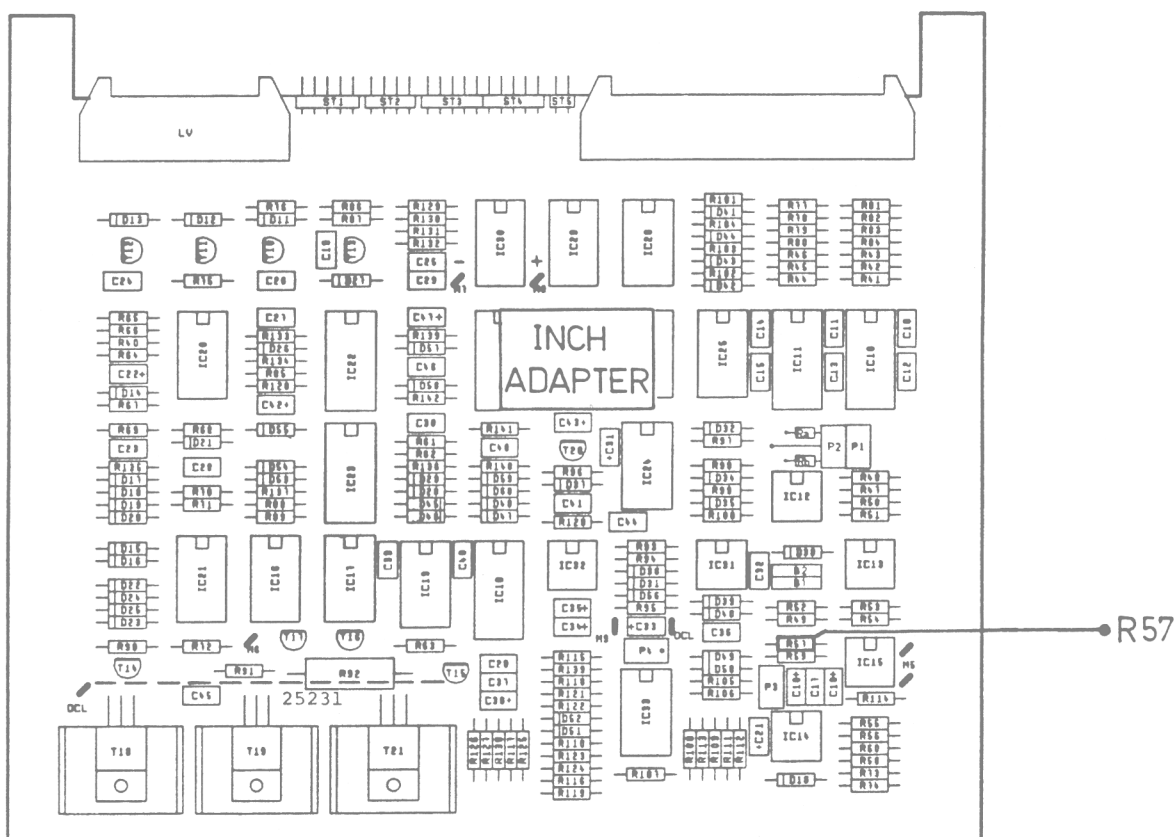      with P2 to <u>7.800</u> micro seconds.
   9. Repeat items 7 and 8 !

Re 85.0

Tolerance Chart
DA/AD-converter   print 25210 B                     Re 17.8.81

Tolerance: ± 2,5%
Reference voltage: 15.00V   (M5, print 25200 B)

| Rate | Voltage at M5 (mV) | | | Period duration at M6 (micro sec.) | | |
|------|------|------|------|------|------|------|
| ml/min | Nom. | Min. | Max. | Nom. | Min. | Max. |
| 1 | 49 | 47,7 | 50,2 | 11720 | 11427 | 12013 |
| 2 | 98 | 95 | 100 | 5860 | 5713 | 6006 |
| 3 | 147 | 143 | 150 | 3906 | 3808 | 4003 |
| 4 | 196 | 191 | 200 | 2930 | 2856 | 3003 |
| 5 | 245 | 238 | 251 | 2343 | 2284 | 2401 |
| 6 | 294 | 286 | 301 | 1953 | 1904 | 2001 |
| 7 | 343 | 334 | 351 | 1674 | 1632 | 1715 |
| 8 | 392 | 382 | 401 | 1464 | 1427 | 1500 |
| 9 | 441 | 430 | 452 | 1302 | 1269 | 1335 |
| 10 | 490 | 478 | 502 | 1172 | 1142 | 1201 |
| 20 | 980 | 955 | 1004 | 586 | 571 | 600 |
| 30 | 1470 | 1433 | 1506 | 391 | 381 | 400 |
| 40 | 1960 | 1911 | 2009 | 293 | 286 | 300 |
| 50 | 2450 | 2389 | 2511 | 234 | 228 | 240 |
| 60 | 2940 | 2867 | 3013 | 195,3 | 190,4 | 200 |
| 69 | 3381 | 3296 | 3465 | 169,8 | 165,5 | 174 |

Layout power supply print 25200 B
BESTUECKUNGSZEICHNUNG STROMVERSORGUNGS

DOLTRON 25200 B   ED 068-81.1

25227

RFI FILTER

TR1

SI

S

C8

IC2   T1   IC1

M2   M3   DO

R29

R4   R28 C7 R3 R2 R1 C6

T5   T3   T4

R31

D1   D9 R11 R16 R21 B2 B1 R23 R22 R26 R25

C1

S S S +   GL1

SI6

LT   LT

M0   L7 L4

D8   C4   L8 L6   D5

LV   20   R8   C5   L5

REL2   R24   C3   L1 L2 L3

D7

R11 R10   R9 R12 R13   M4   IC3   R14 R15 D6 R19 R20   R21 M1   T2

R1   RD1   R18   D3 D2

SI   SI

R6

R5

REL1

D4

6
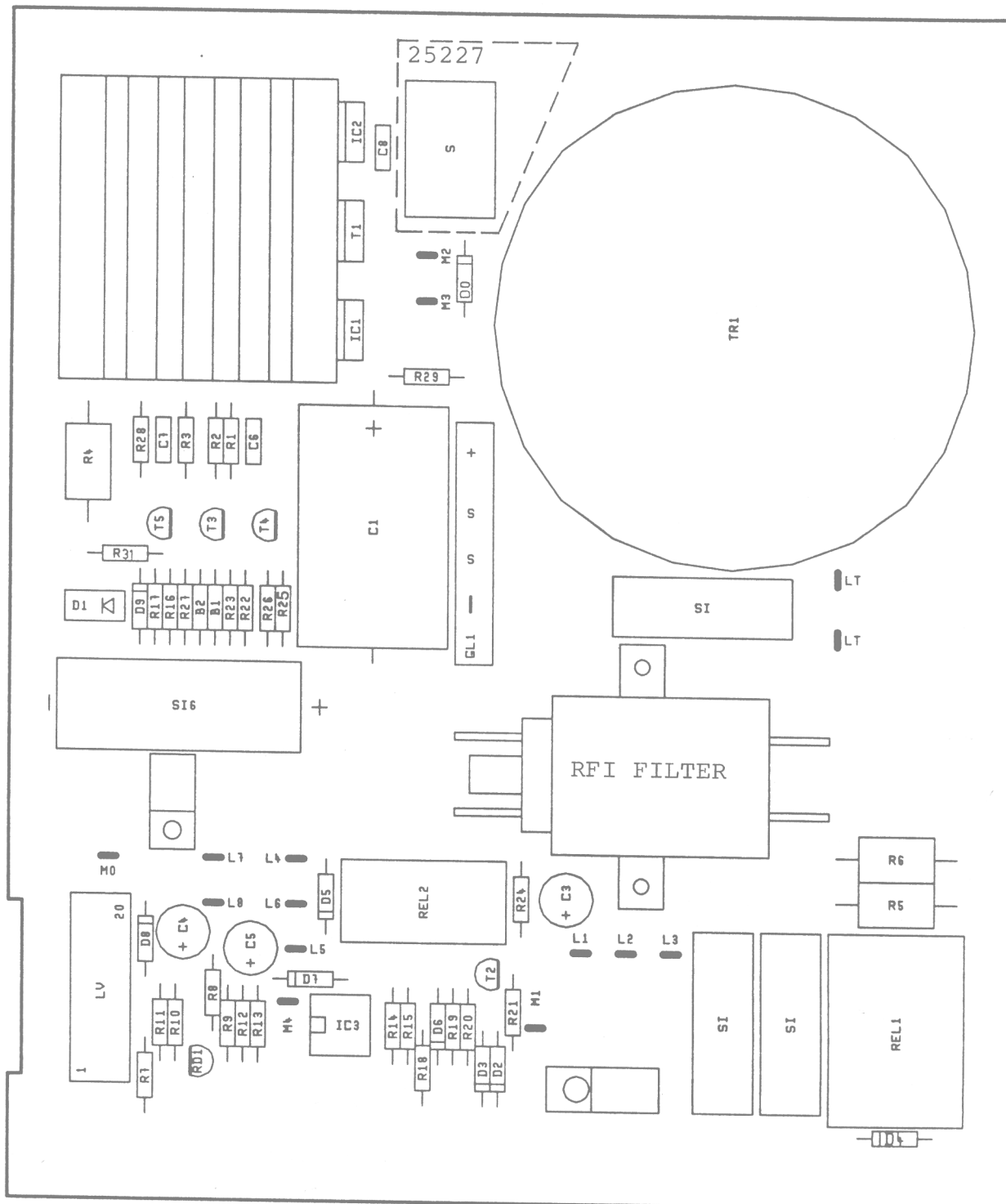
Layout control print 25210 B
BESTUECKUNGSZEICHNUNG STEUERPRINT PIM 711
DOLTRON 25210 B   ED 069-81
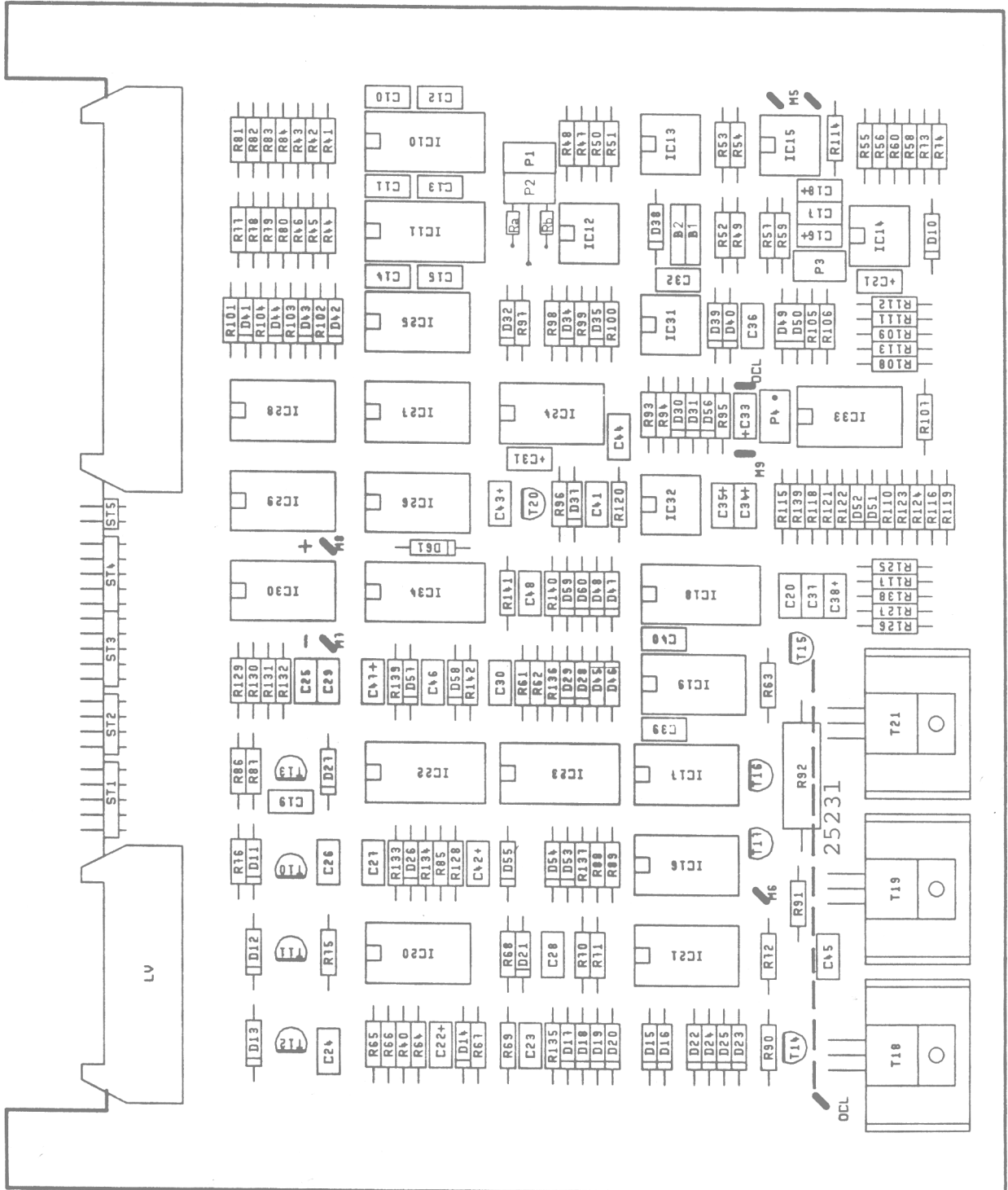
Re 82.1

23.06.81/1

Layout display print 25220 B

BESTUECKUNGSZEICHNUNG ANZEIGEPRINT PIM 717

DOLTRON 25 220B ED 010-81

A

B

C

D

E

F

G

H

J

K

C501 +

R162

D66 D65 R150 R151 R153 R152 — SOL

SOS

IC35

R156 R157 R154 R155 — SRL

SRS

IC36

R161 R160 R158 R159 — ESL

ES

IC37

DPS
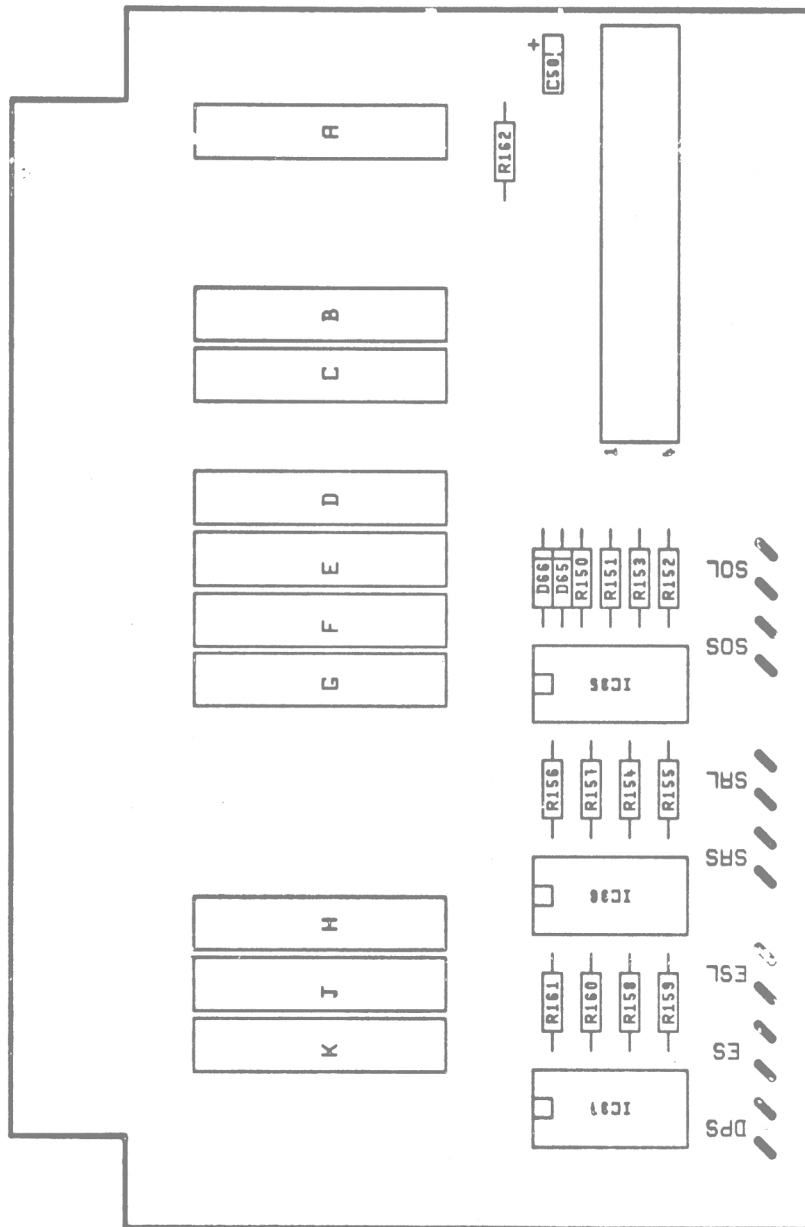
# DOLTRON PIM 717    Re 10.1.82 / 20.11.82
## Bestückungszeichnung
Layout print 25215A/25226A/ 25225/ 25227

Blink Print 25225

R175
C64

Summer Print 25227

D77
Ic41
B3
Ic40
C66
R S
R 1
1 8 7
8 0 9

Blink Print 25226A

R178
R176
R177
C65

Muting Print 25215A

R173
C63
T22 R174
C62
Ic38
C61
R172
R171
C60
R170
Switch

Re 81/82.2
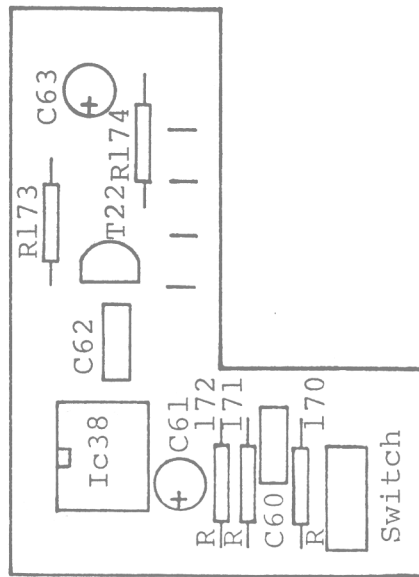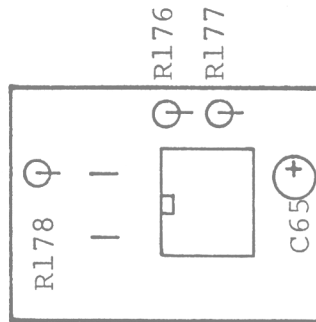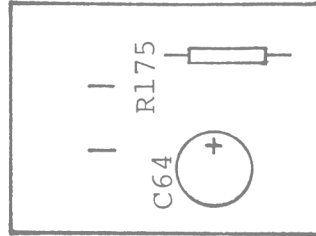
Flow Diagramm for PIM 717
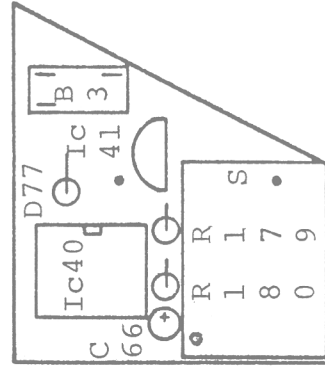
# Prinzipschema PIM 717

Re  April 82

MUTING-PRINT
25215

25200 STROMVERSORGUNGS-PRINT / POWER SUPPLY PRINT

Si

Si

RIF
Filter

Tr 1

Si/Gl 1/
C 1

+27V
T 1/Ic 1

M1

Rel 1

25227

S
Ic 40
Buzzer-
Print

Ic 38

M3

Battery

Si

Si

+15V
Ic 2

M3
M4

Battery
alarm
Ic 3

Rel 2

Nurse call

M0

25210  STEUER-PRINT / Control print     Connector 1 -20

DA converter
Ic 10/11/12/13
P 1/ P 2

M 5

DA
converter
Ic 15/P3

M 6

½ Ic
19

60 : 1
Ic 16/17

½ Ic
19

128 : 1
Ic 18

F1

Motor tacho
sensor

T13

MF
½ Ic 22

4 : 1
Ic 26

10 : 1
Ic 27

10 : 1
Ic 28

10 : 1
Ic 29

10 : 1
Ic 30

Ic 24
25

1A-D      2A-D      3A-D      4A-D

up-down
counter
Ic 23

Motor
output stage
T 14/18/19

Motor

Generator
Ic 31

MF
½ Ic 22

F1

OK

Control
circuit
Ic 34      T 21

FF
½ Ic 21

Pump lid

Alarm circuit          End

"Air"
Ic 33
T 15
P 4

"delta S"
Ic 32
T 16/17

"End"
¼
Ic 21

FF
Start/
Stop
½ Ic 20

OK

FF
Alarm
½ Ic 20

Air sensor

25220  Display print          Connector 1- 40

BLINK-PRINT
25226

Komparator
Ic 35/36/37

Ic 39

ON/OFF      START      STOP

Total
selec-
tor

Total
dis-
play

Rate
selec-
tor

m/h
selec-
tor

8B

# Doltron PIM

Stromversorgungsprint 25200 b    Re   Feb. 81 / Juni 81.1
Power supply print 25200B



Mains: 27V
M2 Battery: 22 - 25V

▲  Print power
   distrib.

△  Print signal
   connec.

○  Connec. print
   25200 - 25210

■  Connec. print
   25210 - 25220

▱  connec. print
   25220 - external

●  Solder supports

Ic 1-3    T 1-5    D 0-9    R 1-31    C 1-8    M 1-4

9
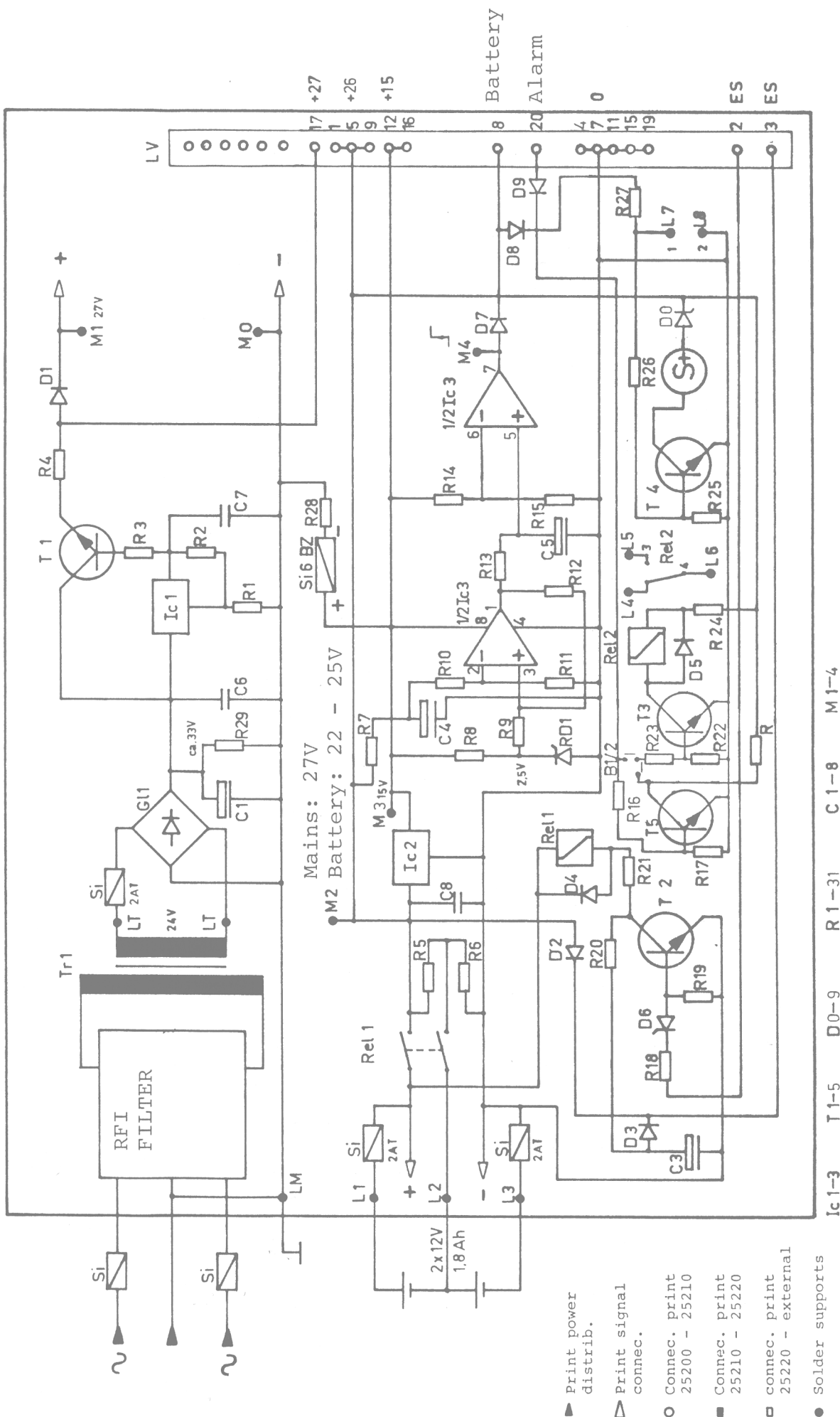
## Parts list PIM 717   power supply print 25200 B

| | | | | | | |
|---|---|---|---|---|---|---|
| C 1 | 3300mF/40V | | R 19 | 10K | 1% | |
| C 3 | 100mF/35V | | R 20 | 10K | 1% | |
| C 4 | 100mF/35V | | R 21 | 150E | 1% | |
| C 5 | 100mF/35V | | R 22 | 100K | 1% | |
| C 6 | 0,1mF/63V | | R 23 | 56K | 1% | |
| C 7 | 0,1mF/63V | | R 24 | 150E | 1% | |
| C 8 | 0,1mF/63V | | R 25 | 100K | 1% | |
| | | | R 26 | 27K | 1% | |
| D 0 | BZX 79C4,7 | | R 28 | 2,2M | 5% | |
| D 1 | BYX 72 | | R 29 | 4,7K | 1% | |
| D 2 | 1N 4448 | | R 30* | 0E Summer adjustment | | |
| D 3 | 1N 4448 | | R 31 | 4,7K | 1% | |
| D 4 | 1N 4007 | | T 1 | BD 234C | | |
| D 5 | 1N 4007 | | T 2 | BC 547B | | |
| D 6 | BZX 79C18 | | T 3 | BC 547B | | |
| D 7 | 1N 4448 | | T 4 | BC 547B | | |
| D 8 | 1N 4448 | | T 5 | BC 547B | | |
| D 9 | 1N 4448 | | | | | |

| | |
|---|---|
| Ic 1 | LM 317T |
| Ic 2 | LM 340T15 |
| Ic 3 | TL 072 |

\* Not applicable with
D 0 available

RD 1      LM 336/2,5V

| | | |
|---|---|---|
| R 1 | 10K | 1% |
| R 2 | 470E | 1% |
| R 3 | 10E | 1% |
| R 4 | 0,1E / 1W | |
| R 5 | 470E / 3W | |
| R 6 | 470E / 3W | |
| R 7 | 4,7K - 5,6K | 1% |
| R 8 | 12K | 1% |
| R 9 | 10K | 1% |
| R 10 | 10K | 1% |
| R 11 | 1,8K | 1% |
| R 12 | 1M | 1% |
| R 13 | 27K | 1% |
| R 14 | 4,7K | 1% |
| R 15 | 10K | 1% |
| R 16 | 56K | 1% |
| R 17 | 100K | 1% |
| R 18 | 1K | 1% |

Re 82.0

Doltron PIM

Teilschema A Steuerprint 25210b    Re  Feb.81/Juni 81/Nov.81
Part schematic A, control print 25210 B

11

Part schematic B
Control print 25210 B

Doltron PIM

Teilschema B Steuerprint   25210b   Re Feb.81/Juni 81

12

Part schematic C, control print 25210 B

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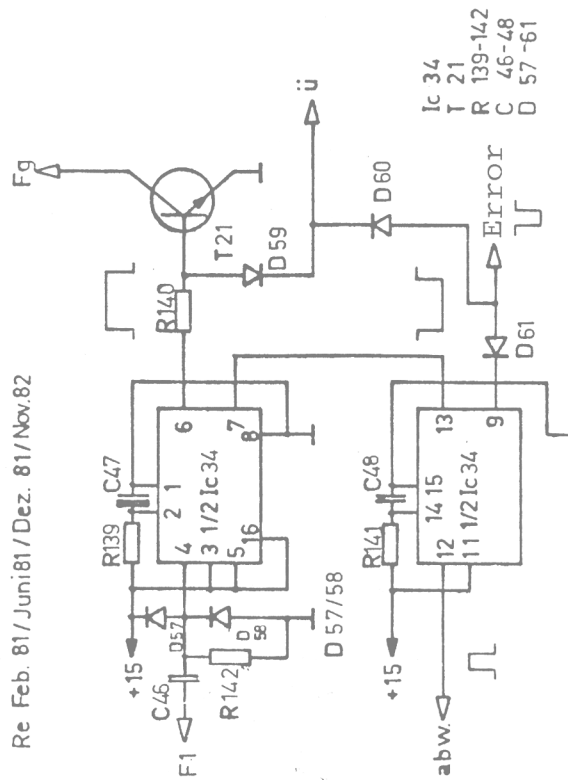
Teilschema C  Steuerprint 25210b
Re Feb. 81/ Juni 81/ Dez. 81/ Nov. 82

Muting-Print 25215

zu Print 25200

+15V ——→ +15V

0V ———

Ic 38
T 22
R 170 - 174
C 60 - 63

L7
T22  zu 25200
L8

Re 82.2

Blink-Print 25225

C 8
C 6
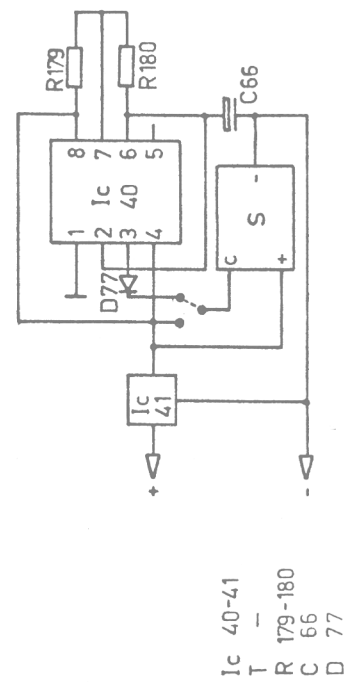
R 175
C 64
D 75

Blink-Print 25226

Ic 39
R 176 - 178
C 65
D 76

C 8
C 6

Ic 34
T 21
R 139 - 142
C 46 - 48
D 57 - 61

Fg
T21
ü
Error
D 57/58
abw.

buzzer - Print 25227

Ic 40-41
T —
R 179 - 180
C 66
D 77

13
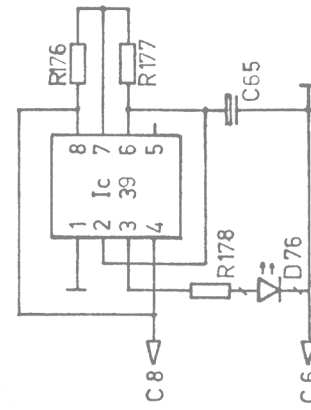
## Parts list PIM 717   control print 25210 B

| | | | |
|---|---|---|---|
| C 10 | 0,01/63V | D 10 | 1N 4004 |
| C 11 | 0,1/63V | D 11 | BZY 79C11 |
| C 12 | 0,1/63V | D 12 | BZY 79C11 |
| C 13 | 0,01/63V | D 13 | BZY 79C11 |
| C 14 | 0,1/63V | D 14-44 | 1N 4448 |
| C 15 | 0,1/63V | D 45-46 | BZY 79C2,4 |
| C 16 | 22mF/25V Tantal | D 47-61 | 1N 4448 |
| C 17 | 4,7nF/63V | | |
| C 18 | 1mF/25V Tantal | Ic 10 | DAC 0800 |
| C 19 | 0,22mF/63V | Ic 11 | DAC 0800 |
| C 20 | 0,22mF/63V | Ic 12 | TL 072 |
| C 21 | 10mF/25V Tantal | Ic 13 | TL 072 |
| C 22 | 2,2mF/25V Tantal | Ic 14 | TL 072 |
| C 23 | 0,22mF/63V | Ic 15 | LM 331 |
| C 24 | 0,22mF/63V | Ic 16 | 74 C90 |
| C 25 | 0,047mF/63V | Ic 17 | 74 C90 |
| C 26 | 2,2nF/63V | Ic 18 | CD 4040 |
| C 27 | 0,1mF/63V | Ic 19 | 74 C00 |
| C 28 | 0,22mF/63V | Ic 20 | 74 C00 |
| C 29 | 0,1mF/63V | Ic 21 | 74 C00 |
| C 30 | 2,2nF/63V | Ic 22 | CD 4098 |
| C 31 | 2,2mF/25V | Ic 23 | 74 C193 |
| C 32 | 0,1mF/63V | Ic 24 | 74 C08 |
| C 33 | 10mF/63V | Ic 25 | 74 C08 |
| C 34 | 22mF/25V | Ic 26 | 74 C90 |
| C 35 | 22mF/25V | Ic 27 | 74 C90 |
| C 36 | 0,1mF/63V | Ic 28 | 74 C90 |
| C 37 | 0,22mF/63V | Ic 29 | 74 C90 |
| C 38 | 10mF/25V | Ic 30 | 74 C90 |
| C 39 | 2,2nF/63V | Ic 31 | ICM 7555 |
| C 40 | 2,2nF/63V | Ic 32 | TL 072 |
| C 41 | 0,01mF/63V | Ic 33 | LM 324 |
| C 42 | 2,2mF/25V | Ic 34 | CD 4098 |
| C 43 | 10mF/25V | | |
| C 44 | 10mF/25V | T 10 | BC 547B |
| C 45 | 0,01mF/63V | T 11 | BC 547B |
| C 46 | 0,1mF/63V | T 12 | BC 547B |
| C 47 | 2,2mF/25V | T 13 | BC 547B |
| C 48 | 0,22mF/63V | T 14 | BC 547B |
| | | T 15 | BC 547B |
| | | T 16 | BC 547B |
| | | T 17 | BC 547B |
| | | T 18 | BDX 33A |
| | | T 19 | BDX 33A |
| | | T 20 | BC 557B |
| | | T 21 | BDX 33A |

Re 82.0

Parts list PIM 717  control print 25210 B

| | | | | | | |
|---|---|---|---|---|---|---|
| R 40 | 10K | 1% | | R 91 | 10K | |
| R 41 | 10K | 1% | | R 92 | 2,2E 4W | |
| R 42 | 10K | 1% | | R 93 | 47K | 1% |
| R 43 | 5,6K | 1% | | R 94 | 470K | 1% |
| R 44 | 10K | 1% | | R 95 | 10K | 1% |
| R 45 | 10K | 1% | | R 96 | 47K | 1% |
| R 46 | 5,6K | 1% | | R 97 | | |
| R 47 | 100K | 1% | | bis | | |
| R 48 | 10K | 1% | | R 104 | 10K | 1% |
| R 49 | 100K | 1% | | R 105 | 1M | 1% |
| R 50 | 10K | 1% | | R 106 | 10K | 1% |
| R 51 | 100K | 1% | | R 107 | | |
| R 52 | 100K | 1% | | bis | | |
| R 53 | 100K | 1% | | R 113 | 100K | 1% |
| R 54 | 10K | 1% | | R 114 | 22K | 1% |
| R 55 | 4,7K | 1% | | R 115 | 1K | 1% |
| R 56 | 100K | 1% | | R 116 | 10K | 1% |
| R 57 | 5,6K | 1% | | R 117 | 10K | 1% |
| R 58 | 10K | 1% | | R 118 | 10K | 1% |
| R 59 | 10K | 1% | | R 119 | 10K | 1% |
| R 60 | 5,6K | 1% | | R 120 | 220K | 1% |
| R 61 | 10K | 1% | | R 121 | 100K | 1% |
| R 62 | 10K | 1% | | R 122 | 100K | 1% |
| R 63 | 10K | 1% | | R 123 | 10K | 1% |
| R 64 | 10K | 1% | | R 124 | 150K | 1% |
| R 65 | 10K | 1% | | R 125 | 100K | 1% |
| R 66 | 10K | 1% | | R 126 | 47K | 1% |
| R 67 | 10K | 1% | | R 127 | 47K | 1% |
| R 68 | 10K | 1% | | R 128 | 10K | 1% |
| R 69 | 10K | 1% | | R 129 | 1K | 1% |
| R 70 | 100E | 1% | | R 130 | 100K | 1% |
| R 71 | 100E | 1% | | R 131 | 10K | 1% |
| R 72 | 10K | 1% | | R 132 | 47K | 1% |
| R 73 | 10K | 1% | | R 133 | 10K | 1% |
| R 74 | 10K | 1% | | R 134 | 100K | 1% |
| R 75 | 2,2K | 1% | | R 135 | 100K | 1% |
| R 76 | 10K | 1% | | R 136 | 100K | 1% |
| R 77 | | | | R 137 | 10K | 1% |
| bis | | | | R 138 | 10K | 1% |
| R 85 | 10K | 1% | | R 139 | 100K | 1% |
| R 86 | 820E | 1% | (1,5K) | R 140 | 10K | 1% |
| R 87 | 820E | 1% | (1,5K) | R 141 | 10K | 1% |
| R 88 | 100K | 1% | | R 142 | 100K | 1% |
| R 89 | 1K | 1% | | | | |
| R 90 | 4,7K | 1% | | P 1 | 50K | |
| Ra | 22K | 1% | | P 2 | 10K (new 2k) | |
| Rb | 18K | 1% | | P 3 | 5K | |
| | | | | P 4 | 5K for black sensor | |
| | | | | P 4 | 50K for brown sensor | |
| | | | | P 4 | 100K for red sensor | |
| Re 82,2 | | | | P 4 | 20K for "DOLTRON Sensor" | |
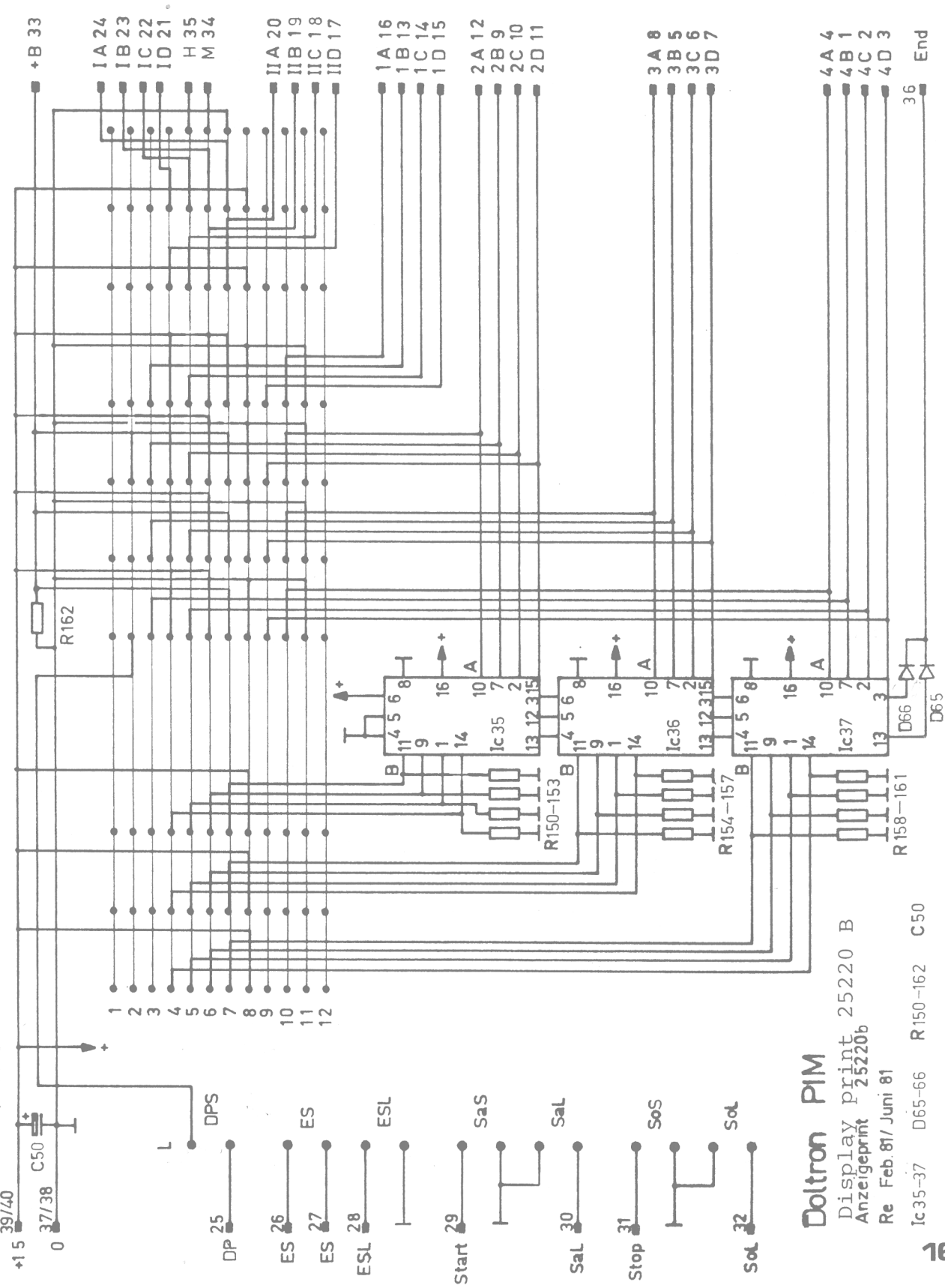
Doltron PIM

Display print 25220 B
Anzeigeprint 25220b

Re Feb.81/ Juni 81

Ic35-37    D65-66    R150-162    C50

16

Parts list PIM 717   display print 25220 B

| | |
|---|---|
| C 50 | 10mF/25V |
| D 65 | 1N 4448 |
| D 66 | 1N 4448 |
| Ic 35 | 74 C85 |
| Ic 36 | 74 C85 |
| Ic 37 | 74 C85 |
| R 150 | |
| bis | |
| R 162 | 10K   1% |


Parts list PIM 717   muting print 25215

| | |
|---|---|
| C 60 | 0,1mF/63V |
| C 61 | 10mF/25V |
| C 62 | 0,1mF/63V |
| C 63 | 22mF/25V |
| Ic 38 | ICM 7555 |
| R 170 | 5,6K |
| R 171 | 10K |
| R 172 | 10K |
| R 173 | 2,2M |
| R 174 | 10K |
| T 22 | BC 547B |


Parts list PIM 717   blink print 25225

| | |
|---|---|
| C 64 | 100mF/25V |
| D 75 | LED FRL-4403 |
| R 175 | 1,5K |


Parts list PIM 717 blink print 25226

| | |
|---|---|
| C 65 | 10mF/25V |
| D 76 | LED |
| Ic 39 | ICM 7555 |
| R 176 | 1,5K |
| R 177 | 22K |
| R 178 | 820E |

Re 22.12.81 .1

Parts list PIM 717  buzzer print 25227

| | | | |
|---|---|---|---|
| C 66 | 10mF/16V | R 179 | 1,5K |
| D 77 | 1N 4448 | R 180 | 22K |
| Ic 40 | ICM 7555 | B 3 | change-over switch |
| Ic 41 | 78L 12A | S | buzzer, Star CMB 12 |
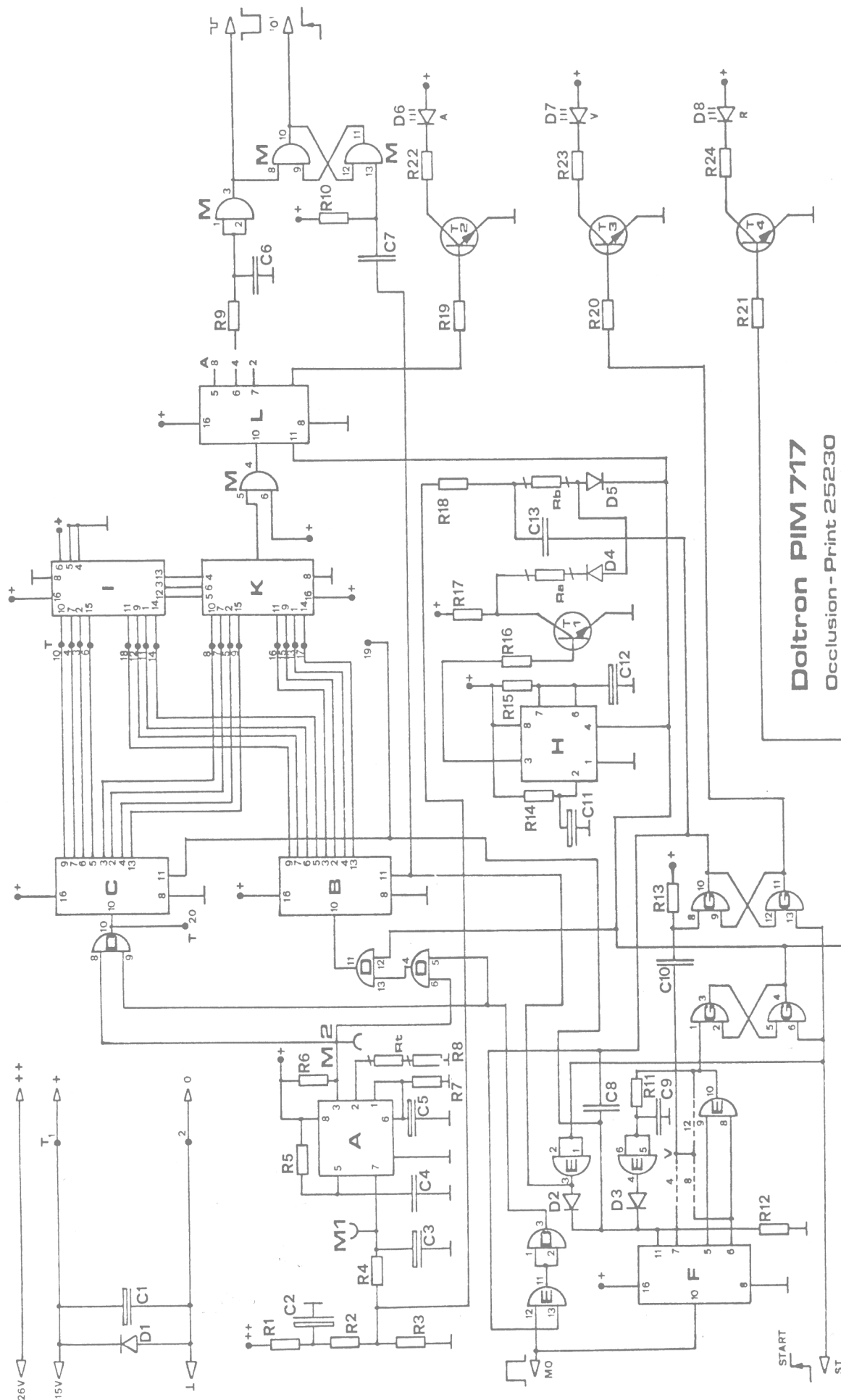
**Doltron PIM 717**
Occlusion-Print 25230
Re April 83

$U_{M1}$ 2.20V $\hat{=}$ $t_{M2}$ 2.70mS

17B

Parts list PIM 717  occlusion print 25230 C

| | | | | |
|---|---|---|---|---|
| C1 | 10mF/25V | | R11 | 10K/1% |
| C2 | 4,7mF/25V | | R12 | 10K/1% |
| C3 | 1mF/25V | | R13 | 10K/1% |
| C4 | 10nF/1% | | R14 | 10K/1% |
| C5 | 1mF/25V | | R15 | 10M/5% |
| C6 | 0,1mF/63V | | R16 | 100K/1% |
| C7 | | | R17 | 10K/1% |
| bis | | | R18 | 1M/1% |
| C10 | 2,2nF/63V | | R19 | 100K/1% |
| C11 | 4,7mF/25V | | R20 | 100K/1% |
| C12 | 22mF/16V | | R21 | 100K/1% |
| C13 | 0,1mF/63V | | R22 | 2,2K/1% |
| | | | R23 | 2,2K/1% |
| D1 | 1N4004 | | R24 | 2,2K/1% |
| D2 | | | | |
| bis | | | Ra | (820K/1%) |
| D5 | 1N4448 | | Rb | (680K/1%) |
| D6 | LED rot | | Rt | (8,2K/1%) |
| D7 | LED gelb | | | |
| D8 | LED grün | | | |
| | | | | |
| Ic A | LM331N | | | |
| Ic B | CD4040 | | | |
| Ic C | CD4040 | | | |
| Ic D | CD4011 | | | |
| Ic E | CD4011 | | | |
| Ic F | CD4040 | | | |
| Ic G | CD4011 | | | |
| Ic H | ICM7555 | | | |
| Ic I | CD4585 | | | |
| Ic K | CD4585 | | | |
| Ic L | CD4040 | | | |
| Ic M | CD4011 | | | |
| | | | | |
| R1 | 100K/1% | | | |
| R2 | 470K/1% | | | |
| R3 | 51K/1% | | | |
| R4 | 10K/1% | | | |
| R5 | 27K/1% | | | |
| R6 | 10K/1% | | | |
| R7 | 100K/1% | | | |
| R8 | 1K/1% | | | |
| R9 | 10K/1% | | | |
| R10 | 10K/1% | | | |

Re April 83.1

DOLTRON PIM 717    Layout occlusion print    25230 C
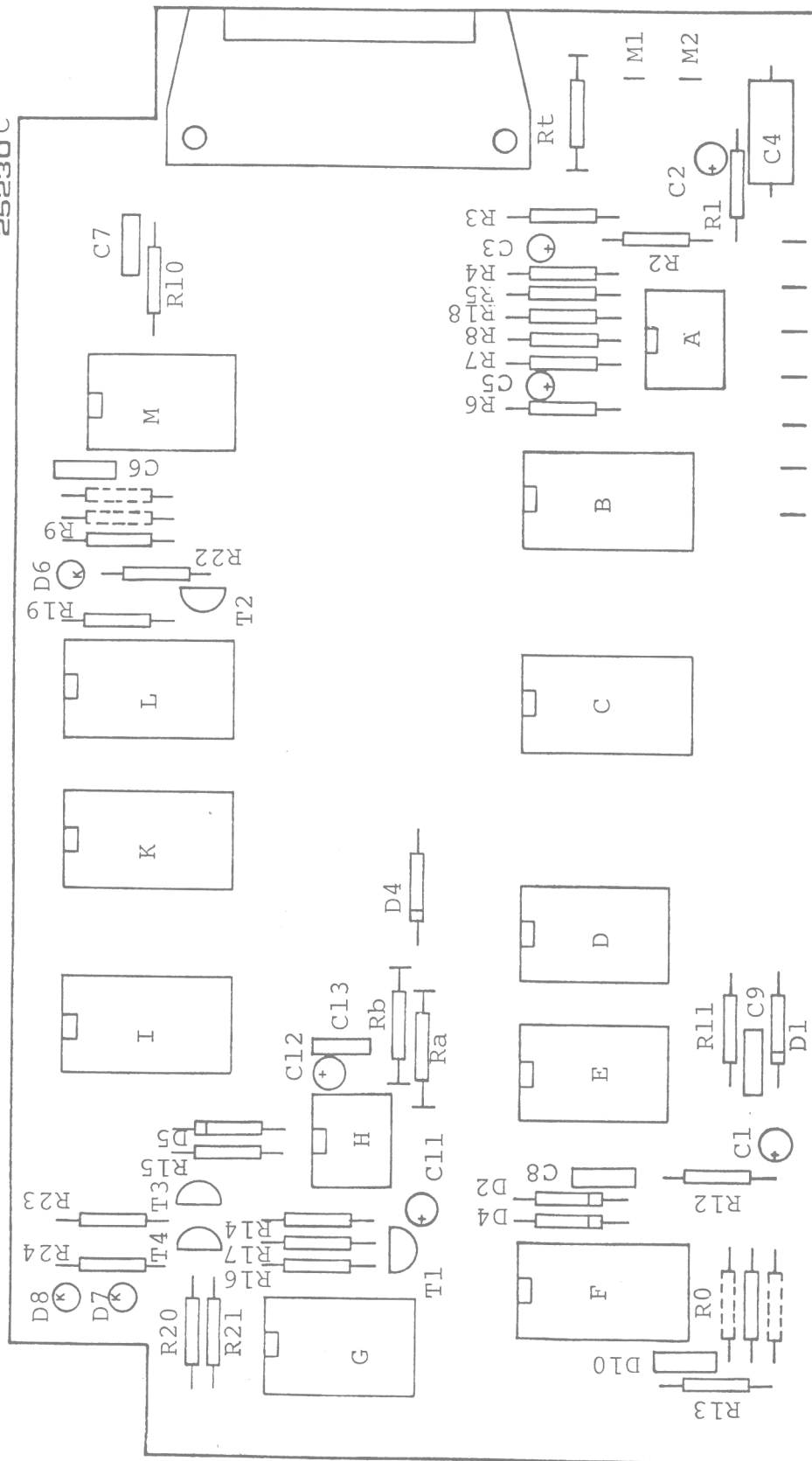


DOLTRON Re April 83

17D

Re April 83.1

17E
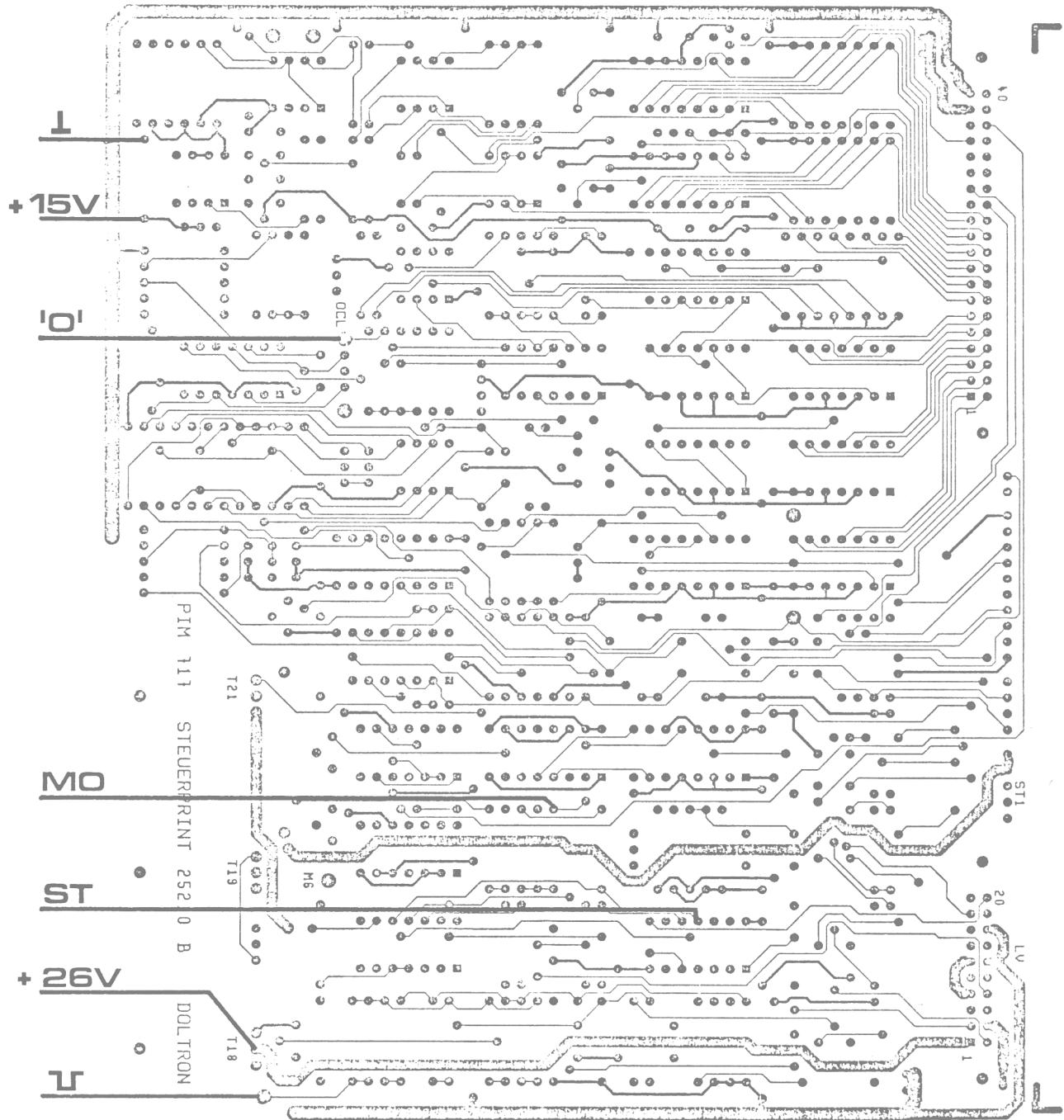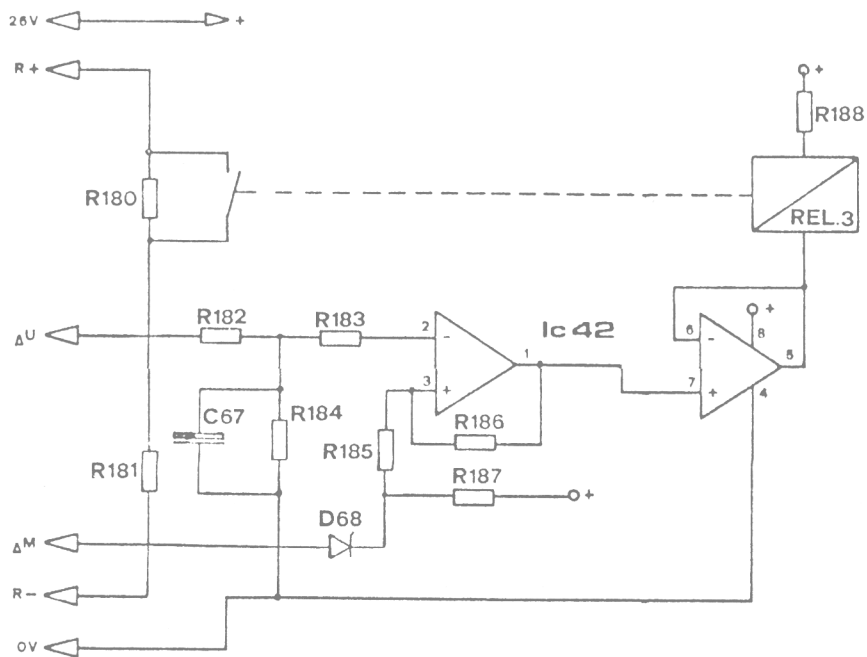
Parts list    PIM 717
Soft-Start Print 25231C

| | |
|---|---|
| C67 | 1 mF/16V |
| D68 | Ref. D. 6,2V |
| R180 | 8,2E/4W |
| R181 | 3,9E/4W |
| R182 | 100K/1% |
| R183 | 10K/1% |
| R184 | 270K/1% |
| R185 | 10K/1% |
| R186 | 4,7M/5% |
| R187 | 10K/1% |
| R188 | 470E/1% |
| REL.3 | 24V/1xU |
| Ic42 | LM 358N |
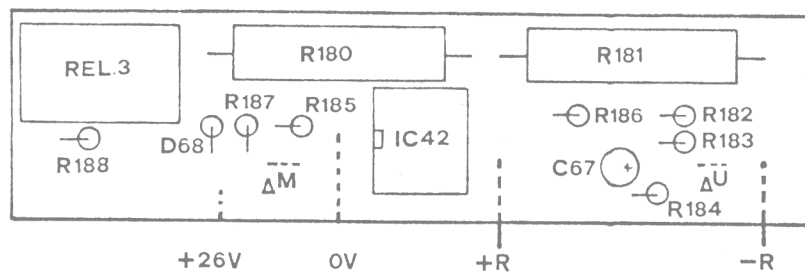
# Doltron  PIM 717

## Soft-Start Print 25231C

Re  Juni 83

7-SEGMENT DISPLAY WITH
BCD INPUT AND MEMORY
---------------------

Circuit diagram



In this module, the display is operated by the BCD
code in positive logic. A control signal (Input EL)
makes it possible to freeze the display and suppress
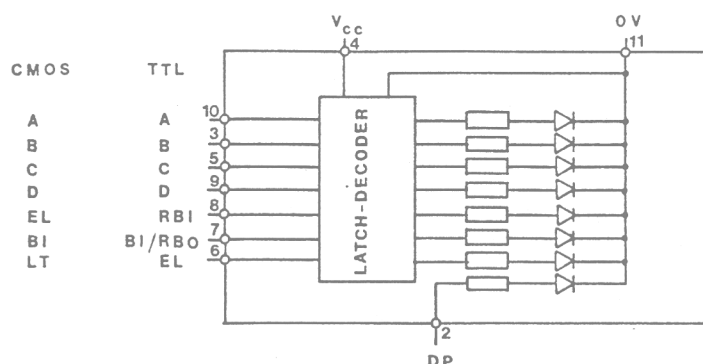response to changing BCD input signals.

Caution: The terminals for TTL and C-MOS are not
identical.

Technical data

| | |
|---|---|
| Colour of display | bright red |
| Digit height | 9 mm |
| Supply current $I_{cc}$ for TTL | typ. 93 mA |
| for C-MOS | " 48 mA |

Input data

| Input voltage (all inputs) | TTL | C-MOS | |
|---|---|---|---|
| $U_{in}$ "0" with $V_{cc}$ = 5V | max. 0.8 V | 1.5 | V |
| = 10V | max. | 3 | V |
| = 12V | max. | 3.6 | V |
| = 15V | max. | 4.5 | V |
| $U_{in}$ "1" with $V_{cc}$ = 5V | min. 2 V | 3.5 | V |
| = 10V | min. | 7 | V |
| = 12V | min. | 8.4 | V |
| = 15V | min. | 10.5 | V |

Input currents

TTL logic: BCD input currents with EL = "0"

$I_{in}$ "0" with $U_{in}$ = 0.4 V          max. - 1.6 mA
$I_{in}$ "1" with $U_{in}$ = 2.4 V          max.   80 uA
With EL = "1" $I_{in}$ = "0" and "1"      max. - 0.1 mA

Inputs EL and RBI

$I_{in}$ "0" with $U_{in}$ = 0.4 V          max. - 1.6 mA
$I_{in}$ "1" with $U_{in}$ = 2.4 V          max.   40 uA

Input BI

$I_{in}$ "0" with $U_{in}$ = 0.4 V          max. - 3.2 mA
$I_{in}$ "1" with $U_{in}$ = 2.4 V          max. - 80 uA

C-MOS logic:   all inputs

$I_{in}$ "0" and $I_{in}$ "1"               typ.   10 pA
Input capacitance $C_{in}$               typ.   5 pF

Output data   (RBO only)

Output voltage

$U_{out}$ "0" with $I_{out}$ = - 3.2 mA          max.   0.4 V
$U_{out}$ "1" with $I_{out}$ = - 80 uA          min.   2.4 V

Output current

$I_{out}$ "0"                    max. - 3.2 mA
$I_{out}$ "1"                    max. - 80 uA

Description of Enable Latch (EL)
and Decimal Point (DP):

EL (Enable Latch)    This instruction will freeze the
                     display and suppress further res-
                     ponse to changes of the BCD input.

                     "EL" on "0"  The display responds
                                  to the BCD input
                                  value
                     "EL" on "1"  The display freezes
                                  on the last value

DP (Decimal Point)   The decimal point must be con-
                     trolled externally. The module
                     features an integral current
                     limiting resistor.

                     "DP" on "0"  Decimal point off
                     "DP" on "1"  Decimal point on

Truth tables

## C-MOS logic

| Inputs | | | | | | | Output |
|---|---|---|---|---|---|---|---|
| EL | LT | $D$ $2^3$ | $C$ $2^2$ | $B$ $2^1$ | $A$ $2^0$ | BI | Display |
| X | 0 | X | X | X | X | X | 8 (Test) |
| X | 1 | X | X | X | X | 0 | none |
| 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | 2 |
| 0 | 1 | 0 | 0 | 1 | 1 | 1 | 3 |
| 0 | 1 | 0 | 1 | 0 | 0 | 1 | 4 |
| 0 | 1 | 0 | 1 | 0 | 1 | 1 | 5 |
| 0 | 1 | 0 | 1 | 1 | 0 | 1 | 6 |
| 0 | 1 | 0 | 1 | 1 | 1 | 1 | 7 |
| 0 | 1 | 1 | 0 | 0 | 0 | 1 | 8 |
| 0 | 1 | 1 | 0 | 0 | 1 | 1 | 9 |
| 1 | 1 | X | X | X | X | 1 | stored* |

X = "0" or "1"

\* controlled by applied BCD code during the leading
  edge of the "EL" instruction signal

## TTL logic

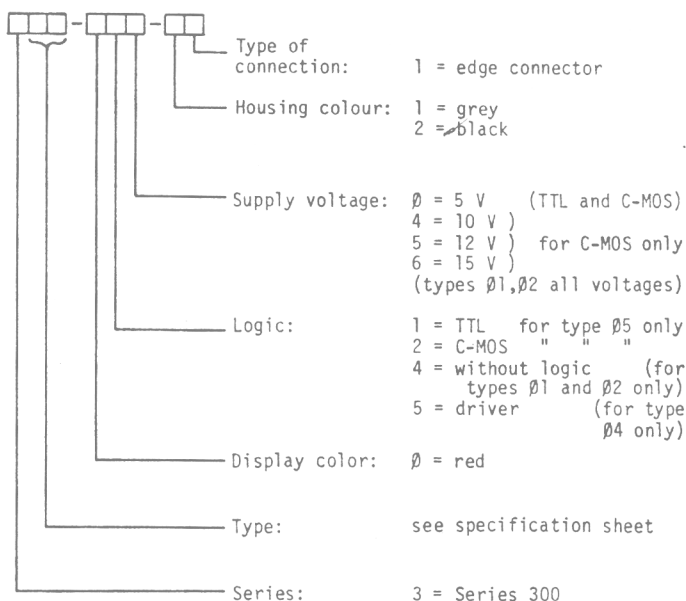| Inputs | | | | | | | Outputs | |
|---|---|---|---|---|---|---|---|---|
| EL | RBI | $D$ $2^3$ | $C$ $2^2$ | $B$ $2^1$ | $A$ $2^0$ | BI 1) | RBO | Display |
| X | X | X | X | X | X | 0 | 0 | none |
| 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | none |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| 0 | X | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| 0 | X | 0 | 0 | 1 | 0 | 1 | 1 | 2 |
| 0 | X | 0 | 0 | 1 | 1 | 1 | 1 | 3 |
| 0 | X | 0 | 1 | 0 | 0 | 1 | 1 | 4 |
| 0 | X | 0 | 1 | 0 | 1 | 1 | 1 | 5 |
| 0 | X | 0 | 1 | 1 | 0 | 1 | 1 | 6 |
| 0 | X | 0 | 1 | 1 | 1 | 1 | 1 | 7 |
| 0 | X | 1 | 0 | 0 | 0 | 1 | 1 | 8 |
| 0 | X | 1 | 0 | 0 | 1 | 1 | 1 | 9 |
| 0 | X | 1 | 0 | 1 | 0 | 1 | 1 | A |
| 0 | X | 1 | 0 | 1 | 1 | 1 | 1 | b |
| 0 | X | 1 | 1 | 0 | 0 | 1 | 1 | C |
| 0 | X | 1 | 1 | 0 | 1 | 1 | 1 | d |
| 0 | X | 1 | 1 | 1 | 0 | 1 | 1 | E |
| 0 | X | 1 | 1 | 1 | 1 | 1 | 1 | F |
| 1 | X | X | X | X | X | 1 | 1 | stored* |

X = "0" or "1"

\* controlled by the applied BCD code during the lead-
  ing edge of the "EL" instruction signal

1) Input BI should only be shifted to "0" to obtain
   blanking of the display irrespective of the BCD
   input. Further information on this input is pro-
   vided in the general data section.

Ordering information for series 300

Display modules:

```
┌─┬─┬─┐ ┌─┬─┬─┐ ┌─┬─┐
└─┴─┴─┘─└─┴─┴─┘─└─┴─┘
```

Type of
connection:        1 = edge connector

Housing colour:    1 = grey
                   2 = black

Supply voltage:    0 = 5 V    (TTL and C-MOS)
                   4 = 10 V )
                   5 = 12 V )  for C-MOS only
                   6 = 15 V )
                   (types 01,02 all voltages)

Logic:             1 = TTL    for type 05 only
                   2 = C-MOS   "    "    "
                   4 = without logic  (for
                       types 01 and 02 only)
                   5 = driver    (for type
                       04 only)

Display color:     0 = red

Type:              see specification sheet

Series:            3 = Series 300

Example:     Type 04 for 10 V, black housing
             Order code 304-054-21

Accessories:

| | | |
|---|---|---|
| 300-01-101 | = | grey dummy housing |
| 300-01-102 | = | black dummy housing |
| 300-03-301 | = | grey end bracket pair |
| 300-03-302 | = | black end bracket pair |
| 300-04-311 | = | thumbwheel switch adapter, grey, left-hand mounting |
| 300-04-312 | = | thumbwheel switch adapter, grey, right-hand mounting |
| 300-04-321 | = | thumbwheel switch adapter, black, left-hand mounting |
| 300-04-322 | = | thumbwheel switch adapter, black, right-hand mounting |
| 300-06-.L. | = | contrast filter (L = length in mm 016, 024, 032) |
| 300-08-.L. | = | mounting clip (L = length in mm)* |
| 000-20-.L. | = | Normally not needed. For larger blockassemblies are mounting clips available. |

| Art No | Designation |
|--------|-------------|
| 24050 | Label, "SEV,IEC,VDE" |
| 25031 | Handle |
| 25034 | Mains power socket connector |
| 25036 | Compensating plug |
| 25038 | Micro switch |
| 25042 | Buzzer 12V |
| 25058 | Motor sensor |
| 25060 | Air sensor (pair, color coded) |
| 25111 | ON/OFF switch, exkl. lamp/cap |
| 25112 | Switch START/STOP excl.lamp/cap |
| 25113 | Cap ON/OFF |
| 25114 | Cap EIN/AUS |
| 25115 | Cap START |
| 25116 | Cap STOP |
| 25118 | Lamp bulp 14V/80mA |
| 25119 | Fuse 630mAT/5x20mm |
| 25121 | Cap remover (tool) |
| 25122 | Lamp remover (tool) |
| 25126 | Endpiece, pair, Multiswich/Displ |
| 25127 | Thumbwheel switch segment |
| 25131 | Spacer "ml" |
| 25132 | Spacer "TOTAL" |
| 25281 | Bottle pole holder |
| 25282 | Clamp screw |
| 25283 | Plastic tip for 25282 |
| 25287 | Lock, snap catch |
| 25289 | Spacer for no. 25034 |
| 25290 | Rubber feet |
| 25010 | Lead acid batteries 2x12V/1.8Ah |
| 25029 | Pump cover |
| 25032 | Label, pump door |
| 25043 | Label, Operating Instruction ger |
| 25044 | Label, Operating Instruction fr. |
| 25045 | Label, Operating Instruction eng |
| 25048 | Transformer 110V/60Hz |
| 25049 | Transformer 240V/50Hz |
| 25050 | Transformer 220V/50Hz |
| 25120 | Fuse 2AT/5x20mm |
| 25128 | Thumbwheel switch, 0-6 |
| 25129 | Thumbwheel switch, m/h |
| 25130 | Spacer, "/" with LED |
| 25133 | Spacer, blank, left of display |
| 25134 | Spacer, blank, right of display |
| 25156 | LED display segment |
| 25157 | LED red filter |
| 25270 | Frontplate |
| 25272 | Backplate |
| 25200 | Power supply print |
| 25210 | Control print |
| 25210i | Control print with inch adapter |
| 25232 | Inch adapter for no. 25210 |
| 25215 | Muting print |
| 25220 | Display print |
| 25230 | Occlusion print |
| 25215 | Muting print |
| 25226 | Blink print |
| 25227 | Summer print |
| 25231 | Soft-Start print |

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## Betr. Gerät(e): PIM 303 und PIM 717

**Problem:**   Nicht erkannte Luftförderung bei falsch eingelegtem Infusionsschlauch.

**Ursache:**   Der Infusionsschlauch wird nicht,wie in der Bediennungsanleitung beschrieben und dokumentiert, in einer Linie durch die Luftsensoren und die Peristaltik geführt. Es besteht die Möglichkeit, mit einigem Geschick den Infusionsschlauch um eine oder beide Luftsensoren herum zu führen. Wenn der Sensor auf der Eingangsseite (links) der Peristaktik umfahren wird, kann das durch die Elektronik nicht erkannt werden.
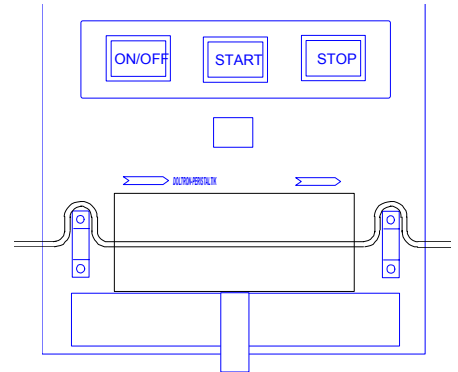
**Lösung:**    1. Klare Instruktion der Personen, die mit PIM 303 und PIM 717 arbeiten. Eventuell fehlende Bedienungsanleitungen nachbestellen.

2. Einbau von zusätzlichen Schlauchführungen im Bereich der beiden Luftsensoren. Durch diese Schlauchführungen wird das richtige Einlegen des Infusionsschlauchs verdeutlicht. Wird der Infusionsschlauch trotzdem ganz bewusst um die Schlauchführungen und Sensoren herumgeführt, so kann der Pumpendeckel nur noch mit erheblichem Kraftaufwand geschlossen werden. In diesem Fall wird der Infusionsschlauch aber abgeklemmt. Es entsteht die Situation der "Nullförderung".
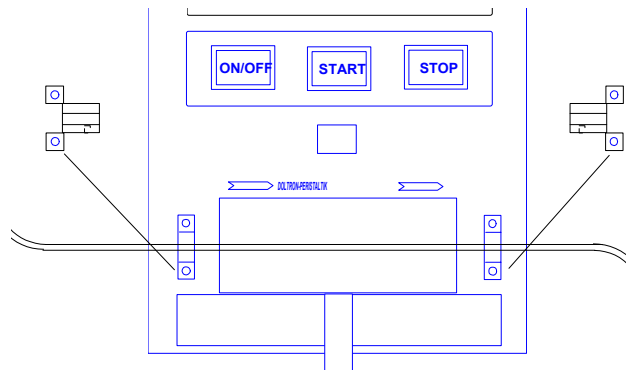
**Hinweis:**   Als vorbeugende Massnahme sollten alle Pumpen der PIM-Serie beim nächsten Service mit Schlauchführungen ausgerüstet werden.
Bei Pumpen des Typs PIM 717, die zusammen mit Spezialbestecken der Serie "HIFLOW" eingesetzt werden, dürfen nur Schlauchführungen eingesetzt werden, die für den Einsatz von HIFLOW-Bestecken nachbearbeitet worden sind.

**Art.Nr.:**   25422   Schlauchführung "links", inkl. Senkschrauben
25423   Schlauchführung "rechts", inkl. Senkschrauben

25427   Schlauchführung "links" Typ HIFLOW, inkl. Senkschrauben
25428   Schlauchführung "rechts" Typ HIFLOW, inkl. Senkschrauben

# *DOTRON*   Code Opto-Sensors

## Used as Air Sensors

| Group | Color code | CTR in % | PIM 303 Board No.: 24225 | | PIM 717 Board No.: 25210 | |
|---|---|---|---|---|---|---|
| | | | P1 | R1 / R2 | P4 | R86 / R87 |
| 1 | blue/red | 5-10 | --- | --- | --- | --- |
| 2 | yellow/red | 11-15 | 50K | 1K | 50K | 1.5K |
| 3 | yellow/red | 16-20 | 50K | 1K | 50K | 1.5K |
| 4 | yellow/red | 21-25 | 50K | 1K | 50K | 1.5K |
| 5 | green/red | 26-30 | 50K / 20K | 1K | 50K / 20K | 1.5K |
| 6 | black/red | 31-35 | 20K | 1K | 20K | 1.5K |
| 7 | black/red | 36-40 | 20K | 1K | 20K | 1.5K |
| 8 | black/red | 41-45 | 20K | 1K | 20K | 1.5K |
| 9 | white/red | 46-50 | 20K | 2.2K | 20K | 2.7K |
| 10 | white/red | 51-55 | 20K | 2.2K | 20K | 2.7K |
| 11 | white/red | 56-60 | 20K | 2.2K | 20K | 2.7K |
| 12 | white/red | 61-65 | 20K | 2.2K | 20K | 2.7K |

## Used as Motor-Sensors

| Group | Color code | CTR in % | PIM 303 Board No.: 24210 R32 | PIM 717 Board No.: 25210 R129 |
|---|---|---|---|---|
| 1 | blue/red | 5-10 | 820E | 1K |
| 6-8 | black/red | 31-45 | 1.5K | 1K |
| 9-12 | white/red | 46-65 | 3.3K | 1K |

---

**Re:**        **PIM 303 und PIM 717**

**Problem:**      The Opto Sensor used as PIM **air-sensors** and **motor-sensors** after having been especially selected, **color coded and grouped together in pairs of blue/red, yellow/red und green/red**, are now no longer available an the market.

**Reason:**      The efficiency (CTR) of these components has been gradually improved over the years. This has also changed their characteristics. For use our pumps we have always had to individually check and group these together in suitable pairs be used for air sensing in PIM. With the improved efficiency of the components, we today can group sensors together coded **black/red** and **white/red** only.

**Solution:**     Please observe, that for the proper function of the PIM air detection feature, viz. motor sensors, when using these new components coded **black/red** and **white/red some resistance values of the circuit in question have to be changed accordingly.**
Exactly which components that matter can be seen in the **Code Opto-sensors document.**

**Important: When performing the "Adjustment Air-Sensors", please, consult and strictly follow the respective PIM 303 and PIM 717 Service-Manuals**

**Hint:**        *The referenced documents are:*
- Code Opto-Sensors
- Service-Manual DOLTRON PIM 303
- Service-Manual DOLTRON PIM 717

**Art.No.:**     

| | | |
|---|---|---|
| Air-Sensor pair | 25060 + Color code | |
| Motor-Sensor | 25058 + Color code | |
| Potentiometer 20K PIM 303 | 98301 | |
| Potentiometer 50K PIM 303 | 98302 | |
| Potentiometer 20K PIM 717 | 98303 | |
| Potentiometer 50K PIM 717 | 98304 | |
| Resistor 820E/0.6W | 98310 | |
| Resistor 1.5K/0.6W | 98311 | |
| Resistor 2.2K/0.6W | 98312 | |
| Resistor 2.7K/0.6W | 98313 | |
| Resistor 3.3K/0.6W | 98314 | |

**Contact:**    

| | | |
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